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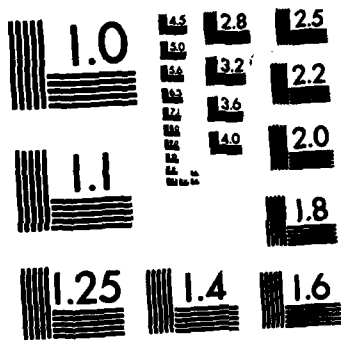
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**Bathymetric Data and Analysis
for the NRL Remote Sensing Experiment:
Phelps Bank, July 1982**

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Environmental Sciences Division*

March 7, 1983



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**BATHYMETRIC DATA AND ANALYSIS
FOR THE NRL REMOTE SENSING EXPERIMENT:
PHELPS BANK, JULY 1982**

1. INTRODUCTION

→ The NRL (Naval Research Laboratory) Remote Sensing Experiment was carried out in and around Phelps Bank (about 40 miles south - southeast of Nantucket Island) during July, 1982. The exercise was the pilot experiment in a program to examine how and why ocean surface expressions of bathymetric features are sometimes manifest. The specific expressions of interest occur in several types of radar images of the ocean surface. The most interest is in SAR (synthetic aperture radar) images since they appear to be most sensitive to the surface bathymetric signatures; and historically these signatures were first observed in SAR imagery.

The exercise involved a surface ship (USNS HAYES) and several aircraft. The HAYES collected Meteorological, Oceanographic and Bathymetric data in the operational area. Since this exercise was concerned with bathymetric effects, the precision depth recorder (PDR) system on the HAYES was continually run while in the area bounded by ^{deg}40° and ^{deg}41°N, and ^{deg}69° and ^{deg}70°W. The maximum concentration of data was in the area ^{min}40°40'N to 41°N and 69° to 69°40'W. This report describes the data, the instrumentation, its method of collection, and finally presents the data in graphical and tabular form.

The data here covers a relatively large area. The same PDR data was more densely scanned in the immediate vicinity of Phelps Bank and plotted in Gordon and Greenewalt (1982). (←

Manuscript approved January 6, 1983.

2. INSTRUMENTATION

To obtain the bathymetric data, precision depth recorders (PDRs), Loran C navigation systems and an HP (Hewlett-Packard) 1000 series computer were used.

The USNS HAYES utilizes two sonar systems in conjunction with the PDRs. The first system is an EDO Western, Model 248E, solid state transceiver set for wide beam at 3.5 kilohertz, a Model 240 head, a 10 kilowatt booster, and a Raytheon LSR-1811 Line Scan Recorder. The second system uses an identical transceiver set at 16 kilohertz, a Model 202 head, and an identical Line Scan Recorder. These systems were installed only one month prior to the experiment and were calibrated to compensate for the draft of the ship. The sonar systems were operated both separately and simultaneously with accuracy within 1 meter of depth.

The Raytheon LSR-1811 Line Scan Recorders were set with a sweep rate of 0.25 seconds per line, and a paper feed of 150 lines per inch. The feed mechanism is accurate to within 0.02 percent. The recorders are calibrated with a sound speed of 1500 m/sec; a typical value for the operational area was 1490 m/sec. Thus, errors in depth due to this factor are about .6%, or less than .5 m.

The navigational data was provided by two Northstar 7000 Loran C systems; the ship's position was determined as a function of Greenwich Mean Time (GMT). This system is accurate to within 200 yards. The Loran data was logged and converted by the HP computer. The navigation was updated once per minute and averaged over 15 minute intervals.

3. METHODOLOGY

Unfortunately, the bathymetric records could not be interfaced to the computer, so the bathymetric had to be read by hand and then manually merged with the navigation file.

Based on the sweep speed and paper feed rate of the Line Scan Recorder, the paper advanced 96 inches per hour. It was decided to average the bathymetry over 15 minute intervals since this was the averaging interval for the other data collected. The time (GMT) of each data record is the end of the averaging interval. Generally in the Phelps Bank area, the HAYES was under way with a speed less than 5 kts, so each 15 minute average is in effect a spatial average of about one nautical mile or less. Within a 15 minute period, the maximum, minimum, and average depths were recorded. Also noted was the presence of sand ridges.

Care was taken to ensure that any apparent change in the displacement rate of the paper¹ would be compensated for. On several occasions, the displacement rate was determined by measuring the distance between two known points in time.

Finally, the data collected was tabulated and placed into a computer file. Once in the file, the data was used to create contour maps of the average, maximum, and minimum depths in the Phelps Bank area. The data was also sorted into latitude and longitude bins.

No correction was made to the depths for sea surface elevation changes due to tidal motion. The closest station to the operational area listed in the Tide Table (1982) is Davis Bank (41°08'N, 69°39'W). There the

1 The apparent paper displacement rate variation was caused by occasional inaccurate time marks on the PDR chart.

spring tidal range is 0.5 m and the mean tide level change is less than 0.2 m. These amplitudes are smaller than the error in the depth data.

4. BATHYMETRIC CONTOURS AND DATA

The 804 bathymetric records are contoured in Figs. 1, 2 and 3. Fig 1 is the field of average depth, Fig 2 is the maximum depth and Fig 3 is the minimum depth in meters per each 15 minute interval; the contour interval is 5 meters. The shallowest depth reported on the NOAA U.S. East Coast Fisheries Chart, 1:220,000 (No. 13203) was 10-1/2 m at 40°48'N, 69°21'W. Two other depth minima of 13 m are reported at 40°49'N, 69°21'W and 40°51'N, 69°21'W, whereas we found 16 m at 40°48.62'N, 69°20.81'W. Another minimum of 17 m was measured at 40°50.66'N, 69°21.08'W. We made no attempt to perform a systematic survey and actually locate the depth minima, whereas the NOAA charts do report the shallowest depths observed at mean low water.

The contouring routine used fits a minimum curvature surface to the data and then grids coordinates on this surface for plotting purposes (the grid points are indicated on the average depth map). There is some scatter in the data. For example, one 1' by 1' tessera contains 21 data points. The average depth in this tessera ranges from 27 to 39 m. These data are plotted on the map in Fig. 4. Note that even though the data spread in the tessera is 12 m, the data is consistent within ± 1 m.

All the data is tabulated in Appendix A and B. The time at the end of the 15 minute period (DTG in Julian day and GMT); location; average, maximum and minimum depths in meters; and the occurrence of sand ridges (1) are listed. Appendix A divides the area from 40°N to 41°N and 69°W to 70°W into 10' by 10' tessera. Appendix B covers the area 40°45'N to 40°55'N

and 69°15'W to 69°25'W subdivided into 1' by 1' tessera. This latter area completely encompasses the Phelps Bank/Asia Rip area.

A summary of the data distribution by latitude and longitude and the fraction of observations which contain sand ridges are given in Table 1. The upper number is the sand ridge fraction and the lower number the total observations in that tessera.

5. ACKNOWLEDGEMENTS

Several support personnel at the Naval Research Laboratory contributed to this report, and their help is gratefully acknowledged. Jack Ostrander, Code 5004, for navigation assistance and help in contouring the data; Lee Huston, Code 5004, for assistance and maintenance of the PDR system; and Chuck McMath, Code 5003, for implementing the contouring algorithm.

6. REFERENCES

Gordon, C.M. and D. Greenewalt "Bathymetric Measurements at Phelps Bank," NRL Memo Report 4964, 15 pp, Nov, 1982.

Tide Tables, 1982: High and Low Water Predictions, 275 pp, National Ocean Survey, Washington, DC 20852.

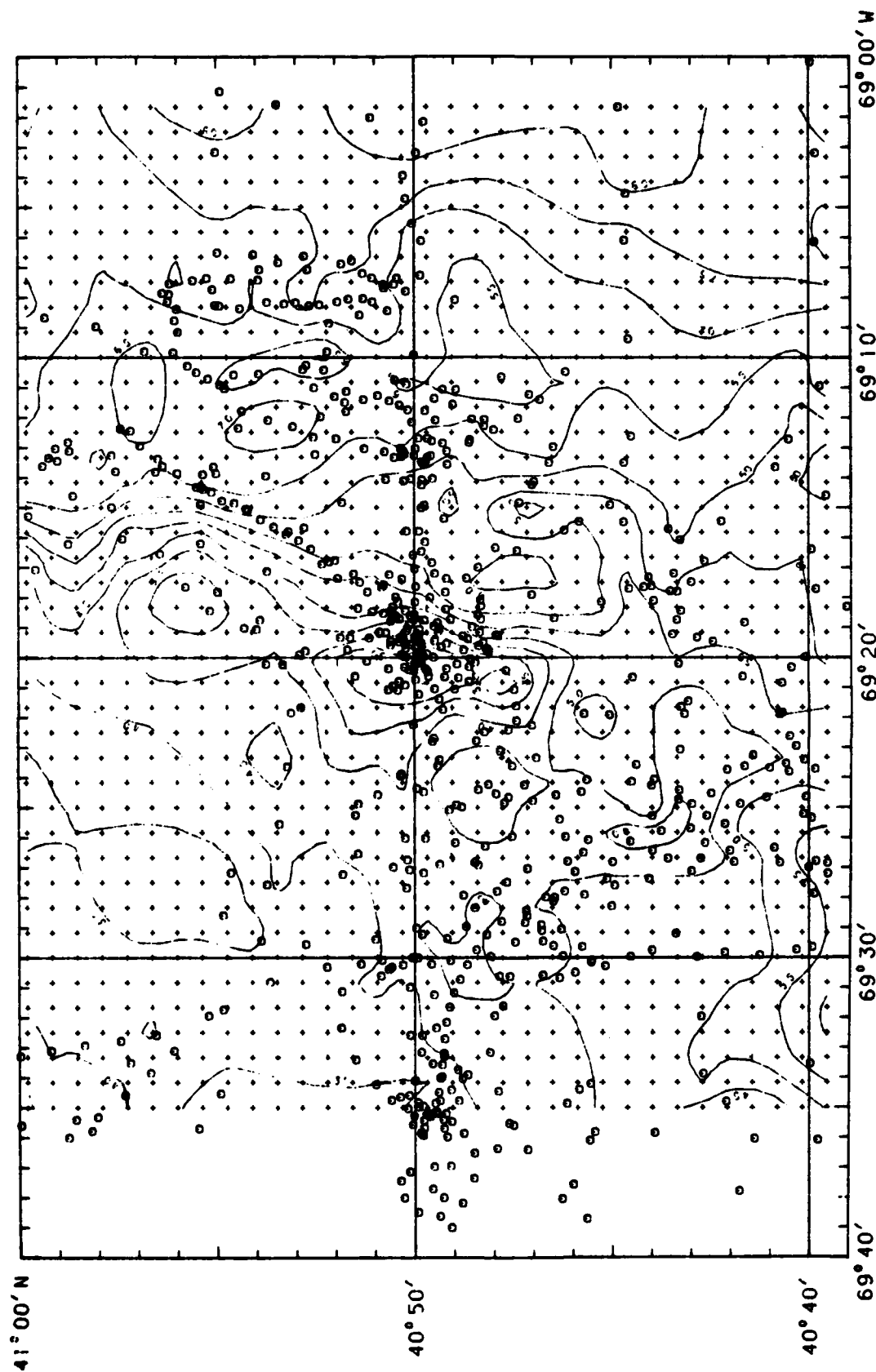


Figure 1. Contours of the average water depth in the Phelps Bank area with locations of the observations (circles) and the interpolation grid for contouring indicated by crosses.

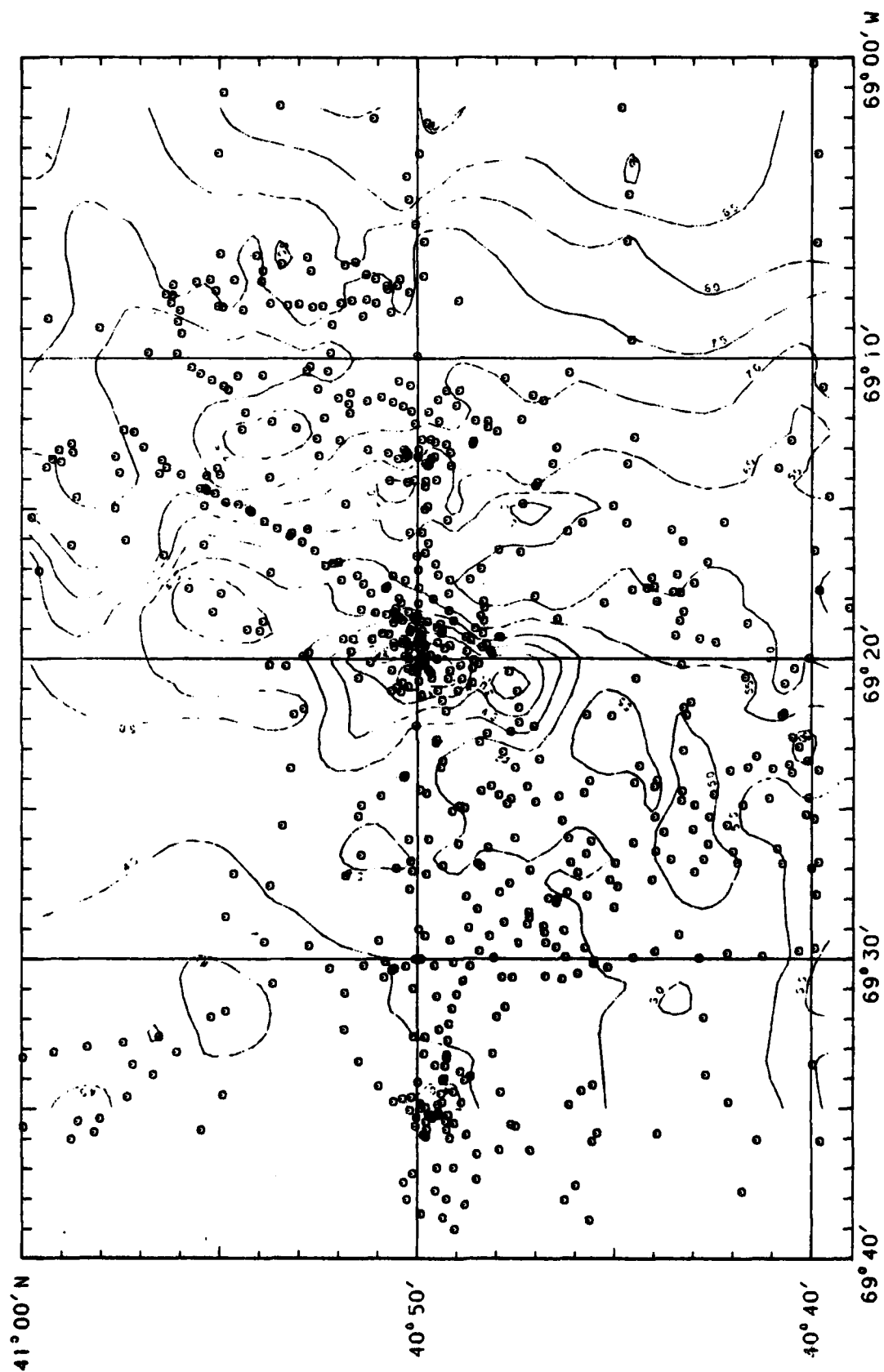


Figure 2. Contours of the maximum depth in the Phelps Bank area.

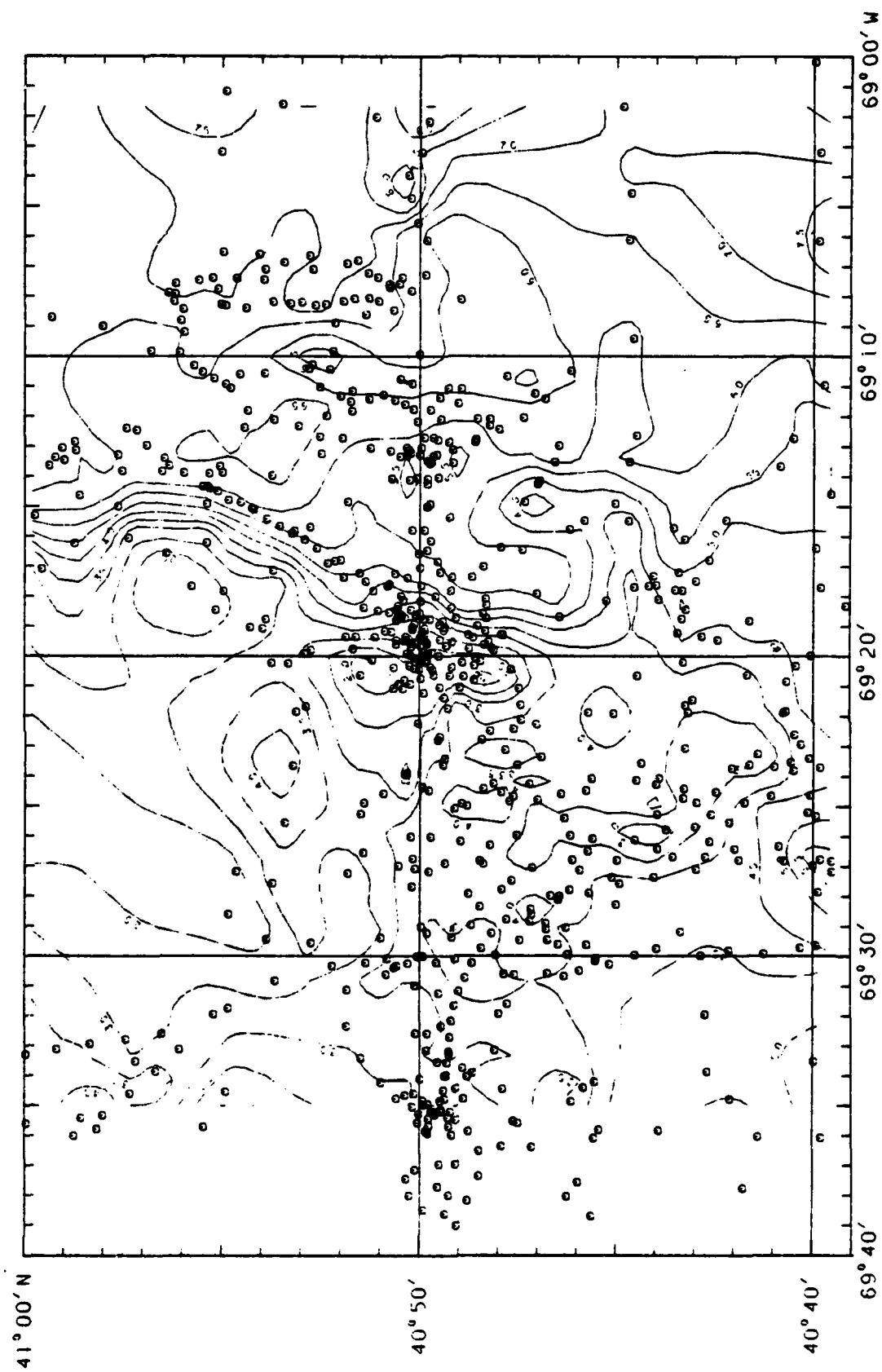


Figure 3. Contours of the minimum water depth in the Phelps Bank area.

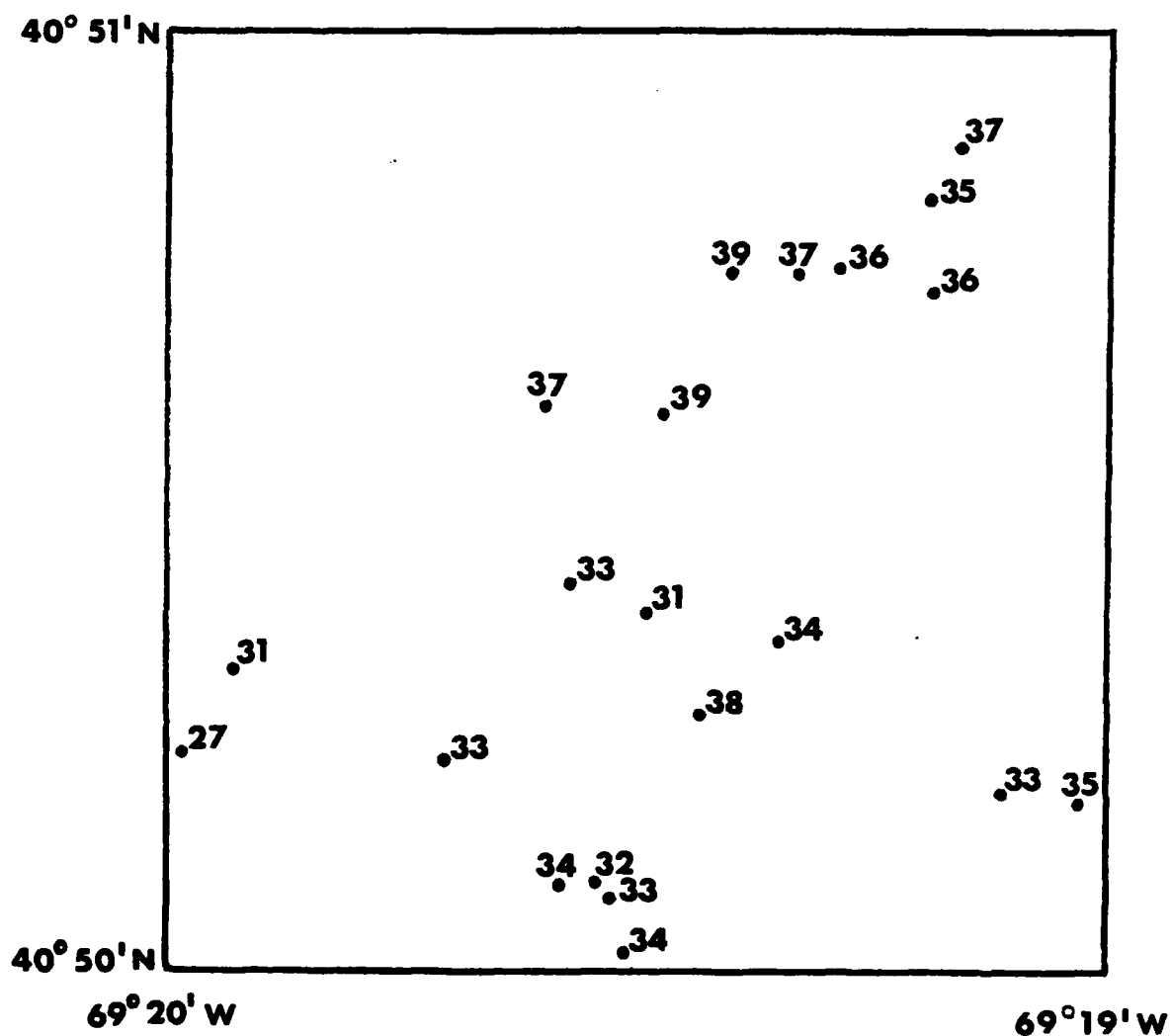


Table 1: Data Distribution and Sand Ridge Occurrence

Latitude	Longitude					
	69°50'- 70°	40'- 50'	30'- 40'	20'- 30'	10'- 20'	69° 69°10'
40°50'- 41°	- 0	1.00 2	.63 46	.55 40	.26 153	.09 64
40'- 50'	.0 3	.73 11	.65 100	.53 163	.20 142	.67 9
30'- 40'	- 0	- 0	.0 9	.03 25	.44 9	.0 7
20'- 30'	- 0	- 0	.0 2	- 0	- 0	- 0
10'- 20'	- 0	- 0	- 0	- 0	- 0	- 0
40°- 40° 10'	- 0	- 0	.83 6	- 0	.33 6	.0 7

Appendix A

All bathymetric data tabulated for each 10 min by 10 min tessera from 41°N to 42°N and from 69°W to 70°W. DTG is Julian Day* and GMT. Sand ridges occur when SR = 1.

*Julian Day 190 = July 9.

BATHYMETRIC MEASUREMENTS OF PHELPS BANK

U.S.N.S. HAYES: JULY 1982

DTG.Z	LAT		LONG		DEPTH(M)			SR
	DEG	MIN	DEG	MIN	AVG	MAX	MIN	

BOX BOUNDS:	40	0.00N TO 40 10.00N;	69	0.00W TO 69 10.00W.				
201/0156	40	3.78	69	9.85	69	75	63	0
201/0211	40	5.08	69	8.92	77	82	72	0
201/0226	40	4.62	69	8.52	78	80	76	0
201/0241	40	3.73	69	8.20	77	80	74	0
201/0256	40	2.67	69	7.97	73	76	69	0
201/0311	40	1.57	69	7.93	74	77	70	0
201/0326	40	.54	69	8.42	73	76	69	0

BOX BOUNDS:	40	0.00N TO 40 10.00N;	69	10.00W TO 69 20.00W.				
201/0126	40	.43	69	12.02	53	62	44	1
201/0141	40	2.16	69	10.99	55	66	44	1
202/0130	40	.11	69	18.32	52	54	50	0
202/0145	40	.53	69	19.48	49	50	48	0
202/0200	40	.82	69	18.28	53	56	49	0
202/0215	40	.86	69	16.32	61	65	56	0

BOX BOUNDS:	40	0.00N TO 40 10.00N;	69	30.00W TO 69 40.00W.				
198/1253	40	2.20	69	35.50	38	47	28	1
198/1308	40	4.65	69	35.87	31	37	24	1
198/1323	40	4.09	69	35.19	36	44	28	0
198/1338	40	2.81	69	34.47	40	46	34	1
198/1354	40	1.80	69	34.05	33	38	28	1
198/1409	40	.80	69	33.63	35	41	29	1

BOX BOUNDS:	40	20.00N TO 40 30.00N;	69	30.00W TO 69 40.00W.				
191/0509	40	28.09	69	31.70	65	66	64	0
191/0524	40	29.89	69	30.23	63	64	62	0

BOX BOUNDS:	40	30.00N TO 40 40.00N;	69	0.00W TO 69 10.00W.				
194/0035	40	39.96	69	.18	68	70	66	0
194/0050	40	39.83	69	3.20	76	82	69	0
194/0105	40	39.85	69	6.15	81	84	78	0
194/0120	40	39.22	69	6.55	80	81	78	0
194/0135	40	36.68	69	6.67	78	81	75	0
194/0150	40	35.12	69	6.85	80	82	78	0
194/0205	40	34.96	69	9.06	76	82	69	0

BOX BOUNDS:	40	30.00N TO 40 40.00N;	69	10.00W TO 69 20.00W.				
194/0220	40	34.96	69	12.50	69	74	62	1
194/0252	40	37.21	69	14.38	57	60	52	1
194/0323	40	39.56	69	14.59	59	63	54	0
194/0338	40	39.81	69	17.71	56	66	45	0
198/2224	40	39.72	69	10.96	69	74	64	1
198/2239	40	38.89	69	10.07	72	78	66	0
198/2254	40	39.23	69	12.96	62	69	54	0

BATHYMETRIC MEASUREMENTS OF PHELPS BANK
U.S.N.S. HAYES: JULY 1982

DTG.Z	LAT		LONG		DEPTH(M)			SR
	DEG	MIN	DEG	MIN	AVG	MAX	MIN	
198/2310	40	39.93	69	16.40	55	63	47	0
200/1640	40	39.11	69	11.11	46	50	39	1

BOX BOUNDS: 40 30.00N TO 40 40.00N; 69 20.00W TO 69 30.00W.

191/0539	40	30.75	69	29.62	62	63	61	0
191/0554	40	32.26	69	28.61	59	61	56	0
191/0609	40	34.42	69	27.00	54	56	52	0
191/0624	40	36.53	69	25.30	51	52	51	0
191/0639	40	38.64	69	23.55	46	51	41	1
194/0446	40	39.83	69	23.71	45	53	44	0
194/0501	40	39.93	69	25.34	49	56	41	0
195/0102	40	32.90	69	29.93	60	61	58	0
195/0117	40	32.12	69	27.49	58	59	57	0
195/0132	40	32.28	69	26.17	58	59	57	0
195/0147	40	33.20	69	23.50	58	59	57	0
195/0202	40	34.37	69	21.01	61	61	60	0
195/0217	40	34.59	69	20.18	61	61	60	0
195/0232	40	34.15	69	22.62	58	60	56	0
195/0248	40	34.61	69	25.65	55	56	53	0
195/0303	40	35.25	69	26.68	53	53	53	0
195/0318	40	37.25	69	26.84	53	53	52	0
195/0333	40	39.24	69	26.73	55	56	54	0
195/0348	40	39.53	69	26.84	56	56	56	0
195/0403	40	39.51	69	27.06	56	56	56	0
195/0418	40	39.52	69	27.19	56	56	56	0
195/0433	40	39.82	69	26.78	56	56	54	0
198/1939	40	39.92	69	29.65	59	51	46	0
198/1954	40	39.87	69	27.87	54	56	51	0
198/2009	40	40.00	69	26.99	56	56	56	0

BOX BOUNDS: 40 30.00N TO 40 40.00N; 69 30.00W TO 69 40.00W.

194/2347	40	39.78	69	36.09	50	52	50	0
195/0002	40	37.49	69	36.17	57	61	52	0
195/0017	40	35.35	69	36.15	63	63	62	0
195/0032	40	34.69	69	35.55	63	63	63	0
195/0047	40	33.83	69	32.79	61	63	59	0
202/1917	40	39.97	69	33.54	56	59	52	0
202/1932	40	37.52	69	33.33	63	64	62	0
202/1947	40	34.86	69	33.23	63	64	62	0
202/2002	40	31.86	69	32.67	63	64	62	0

BOX BOUNDS: 40 40.00N TO 40 50.00N; 69 0.00W TO 69 10.00W.

193/0111	40	49.84	69	7.28	71	73	68	0
193/0126	40	49.82	69	6.13	65	73	57	1
193/0141	40	49.95	69	3.20	81	90	72	0
193/0156	40	49.76	69	2.17	83	85	81	0
193/2243	40	44.58	69	9.40	67	75	59	1

BATHYMETRIC MEASUREMENTS OF PHELPS BANK

U.S.N.S. HAYES: JULY 1982

DTG.Z	LAT		LONG		DEPTH(M)			SR
	DEG	MIN	DEG	MIN	AVG	MAX	MIN	
193/2258	40	44.68	69	6.12	72	78	64	1
193/2313	40	44.64	69	4.56	81	90	70	1
193/2328	40	44.83	69	1.67	80	89	69	1
195/1935	40	48.96	69	8.10	62	72	55	1

BOX BOUNDS: 40 40.00N TO 40 50.00N; 69 10.00W TO 69 20.00W.

191/0725	40	42.43	69	19.47	48	56	39	1
191/0740	40	43.25	69	18.45	54	59	47	0
191/0755	40	44.00	69	17.63	57	58	56	0
191/0810	40	44.07	69	17.33	57	64	49	0
191/0825	40	44.07	69	17.33	57	64	49	0
191/0840	40	44.07	69	17.33	57	64	49	0
191/0855	40	43.94	69	18.11	49	55	41	0
191/0910	40	43.52	69	17.79	50	58	40	1
191/0925	40	43.27	69	16.10	61	62	61	1
191/0940	40	42.99	69	17.49	52	56	47	0
191/0955	40	42.84	69	19.34	51	57	44	0
191/1010	40	43.46	69	19.23	51	57	45	0
191/1025	40	43.34	69	17.81	52	62	41	1
191/1040	40	44.19	69	17.66	54	62	46	0
191/1055	40	45.27	69	18.15	57	59	46	0
191/1110	40	46.46	69	18.69	56	59	53	0
191/1125	40	47.89	69	19.29	48	53	35	1
191/1140	40	49.08	69	18.73	53	55	50	1
191/1155	40	49.89	69	18.76	41	50	25	1
192/1756	40	49.97	69	19.65	31	33	29	0
192/1811	40	49.94	69	19.61	32	38	25	0
192/1856	40	49.96	69	19.03	35	37	32	0
192/1911	40	49.95	69	19.28	34	37	31	0
192/1926	40	49.92	69	19.85	29	33	25	0
192/1941	40	49.83	69	19.52	32	38	25	0
192/1956	40	49.87	69	19.07	37	40	35	0
192/2211	40	47.34	69	14.85	46	50	40	0
192/2226	40	46.97	69	14.15	56	65	47	0
192/2241	40	46.59	69	13.52	65	67	63	0
192/2256	40	47.02	69	14.25	58	67	47	0
192/2311	40	47.95	69	16.37	59	62	56	0
192/2326	40	49.21	69	17.82	57	59	55	0
192/2341	40	49.09	69	17.82	57	59	55	0
192/2356	40	48.68	69	17.36	61	67	56	0
193/0011	40	49.24	69	15.37	63	71	58	1
193/0026	40	49.81	69	13.49	64	73	50	0
193/0041	40	49.66	69	12.71	71	72	69	0
193/0811	40	50.00	69	18.57	42	47	38	1
193/0826	40	49.50	69	18.96	40	44	34	1
193/0841	40	49.18	69	19.54	30	33	26	0
193/0926	40	48.75	69	19.76	28	30	25	0

BATHYMETRIC MEASUREMENTS OF PHELPS BANK
U.S.N.S. HAYES: JULY 1982

DTG.Z	LAT		LONG		DEPTH(M)			SR
	DEG	MIN	DEG	MIN	AVG	MAX	MIN	
193/0941	40	48.65	69	19.38	39	47	30	0
193/0956	40	48.54	69	18.99	52	58	45	0
193/1011	40	48.40	69	18.58	57	58	56	0
193/1026	40	48.31	69	18.30	57	57	56	0
193/1041	40	48.28	69	18.21	57	58	56	0
193/1056	40	48.31	69	18.42	57	58	56	0
193/1111	40	48.32	69	18.73	55	59	51	0
193/1126	40	48.34	69	19.16	45	52	37	0
193/1141	40	48.37	69	19.62	32	37	25	0
193/1311	40	48.25	69	19.52	47	57	35	0
193/1326	40	47.94	69	19.29	50	60	38	0
193/1341	40	48.18	69	19.74	35	35	35	0
193/1732	40	49.98	69	18.17	45	55	34	0
193/2107	40	48.33	69	18.09	58	59	56	0
193/2143	40	47.03	69	17.92	59	61	56	0
193/2158	40	45.83	69	15.48	57	63	50	1
193/2213	40	44.69	69	13.52	63	64	62	0
193/2228	40	44.51	69	12.64	62	67	55	0
194/0353	40	40.07	69	19.98	54	60	47	0
195/0633	40	43.35	69	18.75	55	58	52	0
195/0647	40	43.43	69	17.21	56	63	48	0
195/0703	40	43.56	69	15.72	62	64	59	0
195/0718	40	44.70	69	15.49	50	62	38	0
195/0733	40	46.20	69	15.77	54	59	49	0
195/0747	40	47.40	69	16.45	61	63	59	0
195/0803	40	48.39	69	17.01	58	59	56	0
195/0818	40	49.18	69	17.37	57	59	55	0
195/0833	40	49.96	69	17.64	55	56	53	0
195/1018	40	49.99	69	19.38	34	37	31	0
195/1103	40	49.81	69	19.59	31	33	29	0
195/1118	40	49.48	69	19.45	32	32	31	0
195/1134	40	49.39	69	19.14	35	38	32	0
195/1149	40	49.41	69	18.84	40	44	35	0
195/1204	40	49.33	69	18.59	48	52	44	0
195/1219	40	49.20	69	18.39	54	56	52	0
195/1305	40	49.32	69	19.65	29	31	27	0
195/1350	40	49.78	69	19.93	29	32	25	0
195/1405	40	49.36	69	19.04	38	44	32	1
195/1420	40	48.77	69	19.29	36	40	32	0
195/1435	40	48.12	69	19.81	33	38	28	0
195/1735	40	49.93	69	19.98	42	54	30	1
195/1750	40	49.99	69	17.05	57	59	55	0
195/1950	40	47.79	69	10.66	63	70	55	1
195/2005	40	46.48	69	12.97	62	66	58	0
195/2020	40	45.04	69	14.91	53	60	45	1
195/2035	40	44.56	69	17.70	46	57	35	1
198/2109	40	41.63	69	18.84	55	59	50	0

BATHYMETRIC MEASUREMENTS OF PHELPS BANK
U.S.N.S. HAYES: JULY 1982

DTG.Z	LAT		LONG		DEPTH(M)			SR
	DEG	MIN	DEG	MIN	AUG	MAX	MIN	
198/2124	40	42.65	69	16.80	56	62	50	1
198/2139	40	42.22	69	15.47	56	62	49	0
198/2154	40	40.85	69	13.67	58	62	54	0
198/2209	40	40.51	69	12.74	62	67	58	0
199/0450	40	49.58	69	13.27	60	66	49	1
199/0505	40	48.23	69	12.30	69	71	66	0
199/0520	40	47.09	69	11.24	62	71	53	1
199/0535	40	46.17	69	10.48	65	70	60	1
199/0550	40	46.25	69	10.69	63	69	56	0
199/0605	40	46.82	69	11.41	66	70	61	1
199/0620	40	47.37	69	12.04	66	69	63	0
199/0635	40	47.99	69	12.43	67	68	65	0
199/0650	40	48.59	69	12.76	65	69	60	0
199/0705	40	49.17	69	13.12	59	65	53	0
199/0720	40	49.75	69	13.56	59	61	57	0
199/0750	40	49.80	69	14.08	57	60	54	0
199/0805	40	49.16	69	13.56	58	65	51	1
199/0820	40	48.61	69	12.86	66	69	63	0
199/0835	40	48.22	69	12.09	65	70	60	0
199/0850	40	48.54	69	12.08	66	69	63	0
199/0905	40	49.27	69	12.86	62	69	55	0
199/0920	40	50.00	69	13.28	57	63	47	1
199/1020	40	49.97	69	13.04	63	63	63	0
201/0612	40	49.73	69	11.78	68	72	63	1
201/0627	40	49.02	69	11.57	60	71	64	0
201/0642	40	48.94	69	11.08	64	69	59	1
201/0657	40	49.28	69	11.07	61	68	54	1
201/0712	40	49.49	69	11.37	68	72	63	0
201/0727	40	49.46	69	12.09	68	71	64	0
201/0742	40	49.55	69	12.78	62	66	58	0
201/0757	40	49.71	69	13.50	60	61	59	0
201/0812	40	49.81	69	14.25	58	61	55	0
201/0827	40	49.82	69	15.01	58	59	57	0
201/0842	40	49.88	69	15.79	56	56	56	0
201/1929	40	49.88	69	19.26	29	33	24	0
201/1944	40	49.51	69	20.00	29	33	24	0
201/2129	40	49.74	69	18.77	42	47	36	1
201/2144	40	49.68	69	19.88	28	31	25	0
201/2159	40	49.90	69	19.98	27	28	26	0
202/0615	40	49.89	69	12.70	63	68	57	1
202/0630	40	49.66	69	13.32	61	62	60	0
202/0645	40	49.53	69	14.04	59	60	58	0
202/0700	40	49.61	69	14.18	59	59	59	0
202/0715	40	49.74	69	14.92	59	61	57	0
202/0730	40	49.72	69	16.15	56	57	55	0
202/0745	40	49.85	69	16.35	55	55	55	0
202/0800	40	49.81	69	16.47	55	56	55	0

BATHYMETRIC MEASUREMENTS OF PHELPS BANK

U.S.N.S. HAYES: JULY 1982

DTG. Z	LAT		LONG		DEPTH(M)			SR
	DEG	MIN	DEG	MIN	AVG	MAX	MIN	
202/0815	40	49.66	69	16.66	58	60	56	0
202/0830	40	49.55	69	16.84	59	60	58	0
202/0845	40	49.47	69	17.04	58	58	58	0
202/0901	40	49.48	69	17.20	58	58	58	0
202/0916	40	49.54	69	17.37	56	56	56	0
202/0931	40	49.60	69	18.00	45	56	34	1
202/0946	40	49.92	69	19.46	32	35	28	0

BOX BOUNDS: 40 40.00N TO 40 50.00N; 69 20.00W TO 69 30.00W.

191/0655	40	40.69	69	21.84	46	52	38	1
191/0710	40	41.68	69	20.64	45	51	39	1
191/1327	40	49.89	69	21.23	26	40	20	0
191/1342	40	49.77	69	24.48	44	50	35	1
191/1357	40	48.48	69	26.82	44	49	35	1
191/1412	40	46.80	69	28.91	49	50	41	0
191/1517	40	46.79	69	29.11	46	47	41	1
191/1532	40	46.29	69	29.06	45	50	41	1
191/1617	40	45.01	69	28.29	46	51	41	1
191/1632	40	46.20	69	27.79	46	52	42	1
191/1647	40	48.48	69	28.35	47	49	37	1
191/1702	40	49.96	69	29.02	47	50	42	1
191/1717	40	48.70	69	28.97	45	50	38	1
191/1732	40	47.21	69	28.84	45	48	38	1
191/1747	40	46.68	69	27.99	45	48	39	1
191/1802	40	47.54	69	25.98	46	53	38	1
191/1817	40	49.36	69	26.90	46	53	37	0
191/1902	40	48.39	69	26.92	45	51	40	1
191/1917	40	47.73	69	24.84	41	48	32	1
191/1932	40	48.94	69	24.92	51	52	41	1
191/2017	40	49.12	69	25.08	44	51	34	1
191/2032	40	47.01	69	24.78	44	53	32	0
191/2047	40	47.04	69	22.27	37	40	28	0
191/2102	40	47.84	69	23.12	47	56	28	1
191/2117	40	49.37	69	23.41	45	50	38	1
191/2147	40	48.14	69	24.24	49	53	38	1
191/2202	40	45.64	69	24.08	46	62	34	0
191/2217	40	45.07	69	21.92	53	59	47	0
191/2232	40	45.71	69	21.88	52	56	40	0
191/2247	40	46.92	69	23.36	43	53	34	0
191/2305	40	48.39	69	24.41	49	53	40	1
191/2320	40	46.42	69	24.59	50	54	37	1
191/2335	40	44.00	69	24.27	47	57	37	0
191/2355	40	43.06	69	21.46	42	50	35	0
192/0010	40	43.17	69	21.88	45	53	35	0
192/0025	40	44.50	69	24.14	48	52	40	1
192/0040	40	46.33	69	25.40	44	53	35	1
192/0055	40	46.18	69	25.98	42	49	31	1

BATHYMETRIC MEASUREMENTS OF PHELPS BANK

U.S.N.S. HAYES: JULY 1982

DTG.Z	LAT		LONG		DEPTH(M)			SR
	DEG	MIN	DEG	MIN	AVG	MAX	MIN	
192/0110	40	43.98	69	25.28	50	57	44	1
192/0125	40	42.14	69	25.55	50	56	39	0
192/0140	40	41.41	69	23.26	47	57	38	1
192/0155	40	41.63	69	23.63	40	50	26	1
192/0210	40	42.64	69	26.18	44	47	39	1
192/0225	40	44.54	69	26.13	35	50	25	0
192/0240	40	45.94	69	27.13	44	48	39	0
192/0255	40	44.99	69	26.81	44	50	38	1
192/0310	40	42.75	69	26.69	43	46	39	1
192/0325	40	41.08	69	24.66	51	56	46	1
192/0340	40	41.75	69	24.88	50	56	44	0
192/0355	40	43.58	69	26.69	43	48	38	1
192/0410	40	45.73	69	26.50	44	50	38	1
192/0425	40	47.92	69	27.78	42	46	38	0
192/0610	40	48.77	69	27.93	41	46	37	1
192/0625	40	49.73	69	26.03	41	47	35	1
192/0655	40	48.97	69	26.17	45	50	38	1
192/0710	40	47.63	69	24.67	46	49	43	0
192/0725	40	45.78	69	24.48	42	51	38	0
192/0740	40	43.93	69	24.07	48	53	36	0
192/0755	40	42.07	69	23.74	44	54	34	1
192/0810	40	40.99	69	23.68	48	53	44	0
192/0825	40	40.08	69	24.64	49	55	44	0
192/0840	40	40.58	69	23.54	44	51	37	0
192/0855	40	40.47	69	23.43	42	50	34	1
192/0910	40	40.11	69	23.41	47	49	45	0
192/0924	40	40.50	69	23.81	48	56	37	0
192/0941	40	42.48	69	24.53	40	45	34	0
192/0956	40	43.31	69	24.73	37	44	32	0
192/1011	40	42.97	69	24.88	43	50	35	0
192/1026	40	42.60	69	25.28	42	48	34	1
192/1041	40	43.75	69	25.78	36	49	23	0
192/1056	40	45.61	69	26.08	44	50	38	1
192/1111	40	46.13	69	26.79	42	47	37	0
192/1126	40	46.46	69	28.00	44	47	39	0
192/1141	40	46.49	69	29.61	45	47	41	0
192/1156	40	46.57	69	29.81	44	47	39	1
192/1211	40	46.76	69	29.46	45	47	39	1
192/1226	40	47.16	69	28.62	45	47	38	1
192/1241	40	47.67	69	27.48	46	49	38	1
192/1256	40	48.22	69	26.30	42	49	34	1
192/1311	40	48.81	69	24.99	46	50	42	1
192/1326	40	49.41	69	23.62	44	49	39	1
193/0856	40	48.92	69	20.22	24	26	22	0
193/0911	40	48.84	69	20.23	24	25	23	0
193/1156	40	48.46	69	20.17	23	25	22	0
193/1211	40	48.62	69	20.81	31	41	16	1

BATHYMETRIC MEASUREMENTS OF PHELPS BANK

U.S.N.S. HAYES: JULY 1982

DTG.Z	LAT		LONG		AUG	DEPTH(M)		SR
	DEG	MIN	DEG	MIN		MAX	MIN	
193/1226	40	48.98	69	21.06	30	42	18	0
193/1241	40	48.88	69	20.68	23	24	22	0
193/1256	40	48.59	69	20.05	29	34	23	0
193/1356	40	48.61	69	20.32	22	22	22	0
193/1411	40	49.18	69	20.38	23	24	21	0
193/1426	40	49.82	69	20.14	26	32	24	0
193/1456	40	49.66	69	20.47	23	25	21	0
193/1511	40	49.23	69	20.65	24	25	21	0
194/0416	40	40.76	69	21.89	50	56	43	1
194/0431	40	40.49	69	22.62	47	49	44	0
194/0516	40	40.88	69	26.34	53	56	48	0
194/0531	40	41.89	69	26.80	47	49	45	0
194/0546	40	42.98	69	27.11	46	48	42	1
194/0601	40	44.06	69	27.37	46	51	40	1
194/0616	40	44.93	69	27.59	46	51	42	1
194/0631	40	45.70	69	27.90	46	51	39	1
194/0647	40	46.49	69	28.12	45	48	41	0
194/0702	40	47.18	69	28.44	45	48	42	0
194/0717	40	47.80	69	28.78	44	49	39	0
194/0732	40	48.18	69	29.24	45	45	45	0
194/0747	40	48.44	69	29.74	46	47	45	0
195/0448	40	40.74	69	26.83	52	55	48	0
195/0503	40	42.00	69	26.43	45	49	41	1
195/0518	40	43.01	69	25.69	42	51	33	1
195/0533	40	43.29	69	24.42	41	50	32	1
195/0547	40	43.27	69	23.07	40	46	33	0
195/0603	40	43.24	69	21.65	50	56	44	0
195/0618	40	43.31	69	20.21	50	56	44	0
195/1320	40	49.85	69	20.20	25	26	24	0
195/1450	40	47.68	69	20.44	23	26	20	0
195/1505	40	47.48	69	21.08	34	37	27	0
195/1520	40	47.43	69	21.63	35	37	34	0
195/1535	40	47.42	69	22.12	38	39	36	0
195/1550	40	47.63	69	22.43	42	44	39	0
195/1605	40	48.23	69	22.49	44	50	37	1
195/1620	40	48.44	69	22.78	44	52	35	1
195/1635	40	47.53	69	23.63	44	48	39	1
195/1650	40	47.22	69	24.26	47	51	43	0
195/1705	40	47.94	69	24.54	47	52	41	1
195/1720	40	49.55	69	22.80	34	50	19	1
195/2050	40	44.47	69	20.66	44	53	34	1
195/2105	40	44.38	69	23.57	48	58	38	1
195/2120	40	43.97	69	26.42	41	50	32	1
195/2135	40	43.38	69	29.19	47	51	42	1
198/1008	40	45.12	69	27.38	46	51	41	1
198/1023	40	47.15	69	27.05	40	50	30	1
198/1038	40	49.77	69	27.18	44	50	38	1

BATHYMETRIC MEASUREMENTS OF PHELPS BANK

U.S.N.S. HAYES: JULY 1982

DTG Z	LAT		LONG		AVG	DEPTH(M)		SR
	DEG	MIN	DEG	MIN		MAX	MIN	
198/1824	40	48.07	69	29.97	43	49	36	1
198/1839	40	46.25	69	29.95	43	48	38	1
198/1854	40	44.53	69	29.97	45	50	40	1
198/1909	40	42.85	69	29.99	49	50	46	0
198/1924	40	41.25	69	29.93	47	50	44	0
198/2024	40	40.14	69	25.21	53	56	46	0
198/2039	40	40.32	69	22.95	45	53	37	1
198/2054	40	40.68	69	20.85	54	63	44	1
198/2325	40	40.44	69	20.33	50	59	41	1
199/0004	40	40.32	69	29.73	53	56	44	0
199/0019	40	42.14	69	29.82	48	51	45	0
199/0034	40	43.98	69	29.75	47	51	43	1
199/0049	40	45.76	69	29.63	46	50	41	1
199/0104	40	47.46	69	29.47	43	47	38	1
199/0119	40	49.18	69	29.36	44	49	38	1
200/2326	40	49.81	69	29.23	44	50	38	1
201/1959	40	49.72	69	20.37	23	24	22	0
201/2014	40	49.98	69	20.20	25	26	24	0
201/2214	40	49.92	69	20.05	28	31	25	0
201/2229	40	49.95	69	20.15	24	27	21	1
201/2244	40	49.97	69	20.74	24	27	22	0
202/1001	40	49.84	69	20.14	25	27	22	0
202/1016	40	49.64	69	20.64	23	24	22	0
202/1031	40	49.48	69	21.05	22	25	19	1
202/1046	40	49.37	69	21.39	30	41	18	1
202/1101	40	49.31	69	21.59	41	42	40	0
202/1116	40	49.28	69	21.74	41	41	41	0
202/1131	40	49.30	69	21.83	39	40	38	0
202/1146	40	49.50	69	22.69	42	50	33	1
202/1201	40	49.94	69	24.37	45	49	41	1

BOX BOUNDS: 40 40.00N TO 40 50.00N; 69 30.00W TO 69 40.00W.

191/1432	40	45.94	69	30.49	46	47	41	0
191/1447	40	46.33	69	30.68	47	48	40	0
191/1502	40	46.76	69	30.59	46	47	41	1
191/1547	40	45.53	69	30.09	45	50	41	1
191/1602	40	45.18	69	30.28	47	51	44	1
192/0440	40	49.09	69	30.10	46	49	42	0
192/0455	40	47.86	69	30.61	44	49	38	1
192/0510	40	47.77	69	31.61	42	46	37	1
192/0525	40	48.66	69	33.91	44	48	37	1
192/0540	40	48.10	69	33.16	38	44	31	1
192/0555	40	47.59	69	30.63	45	49	41	1
194/0802	40	48.67	69	30.24	48	49	47	0
194/0817	40	48.85	69	30.73	44	49	38	0
194/0832	40	49.01	69	31.18	47	50	42	0
194/0847	40	49.12	69	31.65	43	47	38	1

BATHYMETRIC MEASUREMENTS OF PHELPS BANK
U.S.N.S. HAYES: JULY 1982

DTG.Z	LAT		LONG		DEPTH(M)			SR
	DEG	MIN	DEG	MIN	AVG	MAX	MIN	
194/0902	40	49.20	69	32.16	42	45	39	1
194/0917	40	49.24	69	32.71	44	46	38	1
194/0932	40	49.26	69	33.20	41	44	37	0
194/0947	40	49.30	69	33.57	38	41	34	0
194/1002	40	49.36	69	34.02	34	40	28	0
194/1017	40	49.39	69	34.50	33	38	28	0
194/1032	40	49.48	69	34.86	37	38	35	0
194/1047	40	49.78	69	34.96	39	40	38	0
194/1102	40	49.95	69	35.03	37	39	34	0
194/1117	40	49.80	69	35.12	35	38	31	0
194/1132	40	49.61	69	35.31	36	38	33	0
194/1147	40	49.46	69	35.31	36	38	33	0
194/1202	40	49.58	69	35.20	33	38	28	0
194/1217	40	49.43	69	35.44	35	40	29	1
194/1232	40	49.26	69	35.70	35	41	30	0
194/1247	40	49.18	69	35.99	40	41	39	0
194/1302	40	49.39	69	35.96	37	42	30	1
194/1317	40	49.76	69	35.69	37	44	29	1
194/1402	40	49.79	69	35.94	39	44	30	1
194/1417	40	49.51	69	36.98	39	44	34	1
194/1432	40	49.27	69	38.01	40	44	36	1
194/1447	40	49.07	69	39.01	39	44	34	1
194/1502	40	48.91	69	39.95	36	39	33	1
194/1647	40	49.35	69	39.69	39	44	33	1
194/1702	40	49.55	69	37.73	39	44	34	1
194/1717	40	49.84	69	35.86	38	44	31	1
194/1832	40	49.36	69	34.78	35	40	29	1
194/1847	40	48.89	69	34.78	36	40	30	1
194/1902	40	49.08	69	34.42	37	40	33	1
194/1917	40	49.32	69	33.99	38	41	34	1
194/1932	40	49.55	69	33.55	37	41	33	1
194/1947	40	49.83	69	33.16	40	41	38	0
194/2002	40	49.92	69	32.90	39	43	34	1
194/2017	40	48.91	69	33.75	38	43	32	1
194/2032	40	47.50	69	35.59	38	44	32	1
194/2047	40	45.99	69	37.57	40	45	34	1
194/2102	40	44.43	69	39.56	43	45	41	1
194/2117	40	44.47	69	39.91	43	45	41	1
194/2132	40	46.27	69	38.05	40	44	36	1
194/2147	40	47.92	69	36.37	40	45	35	0
194/2202	40	49.44	69	35.21	40	45	35	0
194/2232	40	49.77	69	35.45	36	44	28	1
194/2247	40	47.62	69	35.53	38	44	31	1
194/2302	40	45.44	69	35.82	43	47	38	1
194/2317	40	43.92	69	35.85	45	50	40	1
194/2332	40	41.39	69	36.05	49	50	45	0
195/2150	40	42.74	69	31.96	49	50	47	0

BATHYMETRIC MEASUREMENTS OF PHELPS BANK
U.S.N.S. HAYES: JULY 1982

DTG.Z	LAT		LONG		DEPTH(M)			SR
	DEG	MIN	DEG	MIN	AUG	MAX	MIN	
195/2205	40	42.11	69	34.80	40	51	44	1
195/2220	40	41.77	69	37.78	49	50	48	0
198/0923	40	45.64	69	38.72	42	45	38	1
198/0938	40	45.84	69	34.41	41	47	35	1
198/0953	40	45.54	69	30.16	43	48	38	1
200/1655	40	49.81	69	32.59	40	47	32	1
200/1710	40	49.92	69	34.83	38	44	31	1
200/1725	40	49.87	69	35.01	36	40	31	1
200/1740	40	49.71	69	35.22	38	40	36	0
200/1755	40	49.28	69	35.41	33	38	28	1
200/1810	40	49.28	69	35.48	34	38	29	0
200/1825	40	49.63	69	35.22	33	38	28	1
200/1840	40	49.91	69	34.98	38	39	37	0
200/1855	40	49.70	69	35.03	35	38	31	0
200/1910	40	49.46	69	35.14	32	35	28	0
200/1925	40	49.21	69	35.21	34	38	29	0
200/1940	40	49.07	69	35.47	34	39	28	1
200/1955	40	48.76	69	35.87	35	41	28	1
200/2010	40	48.50	69	36.52	38	42	33	1
200/2025	40	48.51	69	37.36	40	43	37	0
200/2040	40	48.80	69	38.19	41	45	37	1
200/2055	40	49.36	69	38.63	41	44	38	0
200/2110	40	49.91	69	38.50	39	44	33	1
200/2210	40	49.09	69	36.96	40	45	34	1
200/2225	40	47.15	69	36.40	40	44	36	1
200/2240	40	45.57	69	36.10	42	47	38	1
200/2255	40	46.15	69	34.88	42	47	38	1
200/2311	40	47.99	69	31.94	45	50	39	1
202/1331	40	49.99	69	34.11	35	40	31	1
202/1702	40	49.92	69	30.01	43	49	38	1
202/1717	40	49.57	69	30.22	43	48	38	1
202/1732	40	49.51	69	31.25	40	45	35	1
202/1747	40	49.46	69	32.35	40	44	35	1
202/1802	40	49.26	69	33.30	40	44	35	1
202/1817	40	48.80	69	34.04	41	48	33	1
202/1832	40	47.89	69	34.45	43	49	37	1
202/1847	40	45.55	69	34.22	47	50	44	0
202/1902	40	42.69	69	33.88	50	52	48	0

BOX BOUNDS: 40 40.00N TO 40 50.00N; 69 40.00W TO 69 50.00W.

194/1517	40	48.77	69	40.90	35	39	32	1
194/1532	40	48.66	69	41.83	35	39	31	1
194/1547	40	48.57	69	42.72	34	38	31	1
194/1602	40	48.52	69	43.56	34	37	31	1
194/1617	40	48.63	69	43.38	35	39	30	1
194/1632	40	49.03	69	41.58	37	41	32	1
195/2235	40	41.52	69	40.80	49	50	48	0

BATHYMETRIC MEASUREMENTS OF PHELPS BANK

U.S.N.S. HAYES: JULY 1982

DTG.Z	LAT		LONG		DEPTH(M)			SR
	DEG	MIN	DEG	MIN	AVG	MAX	MIN	
195/2250	40	41.25	69	43.86	52	53	50	0
198/0838	40	48.65	69	42.73	35	40	30	1
198/0853	40	45.93	69	42.69	40	43	36	1
198/0908	40	45.19	69	42.44	38	41	35	0
BOX BOUNDS: 40 40.00N TO 40 50.00N; 69 50.00W TO 70 0.00W.								
193/2343	40	44.93	69	58.67	70	71	69	0
193/2358	40	44.21	69	57.95	70	72	69	0
194/0013	40	41.73	69	58.69	68	70	65	0
BOX BOUNDS: 40 50.00N TO 41 0.00N; 69 0.00W TO 69 10.00W.								
193/0056	40	50.01	69	9.93	71	72	69	0
193/0211	40	51.10	69	2.02	83	90	77	1
193/0226	40	53.48	69	1.59	79	88	71	0
193/0241	40	54.90	69	1.16	84	85	81	0
193/0256	40	55.02	69	3.18	79	84	73	0
193/0311	40	54.97	69	6.52	75	78	71	0
193/0326	40	55.03	69	8.27	70	74	65	0
195/1835	40	50.21	69	7.81	68	78	59	1
195/1850	40	50.22	69	4.73	77	90	84	1
195/1905	40	50.28	69	3.96	78	90	85	1
195/1920	40	50.05	69	5.55	69	75	62	1
199/1406	40	56.08	69	9.85	66	66	66	0
199/1421	40	55.99	69	9.60	66	66	66	0
199/1436	40	55.97	69	9.18	66	67	65	0
199/1451	40	56.05	69	8.79	69	69	68	0
199/1506	40	56.03	69	8.80	69	70	68	0
199/1521	40	56.00	69	8.41	71	72	70	0
199/1536	40	56.22	69	8.16	71	72	69	0
199/1551	40	56.36	69	7.87	73	74	72	0
199/1606	40	56.18	69	7.56	75	78	72	0
199/1621	40	55.24	69	7.38	71	72	70	0
199/1636	40	54.63	69	7.39	75	78	72	0
199/1651	40	53.94	69	7.44	75	80	70	0
199/1706	40	53.91	69	7.09	67	74	60	0
199/1721	40	54.06	69	6.59	71	71	71	0
199/1736	40	53.43	69	6.86	76	84	68	0
199/1752	40	52.70	69	7.09	78	80	75	0
199/1807	40	52.78	69	6.64	73	78	68	0
199/1822	40	52.65	69	6.55	80	87	72	0
199/1837	40	51.84	69	6.90	79	82	75	0
199/1852	40	51.57	69	6.80	79	82	75	0
199/1907	40	51.45	69	6.98	76	80	72	0
199/1922	40	51.30	69	7.22	69	72	63	0
199/1937	40	51.06	69	7.36	72	74	70	0
199/1952	40	50.86	69	7.45	72	72	72	0
199/2007	40	50.78	69	7.59	71	72	69	0

BATHYMETRIC MEASUREMENTS OF PHELPS BANK

U.S.N.S. HAYES: JULY 1982

DTG.Z	LAT		LONG		DEPTH(M)			SR
	DEG	MIN	DEG	MIN	AVG	MAX	MIN	
199/2022	40	50.51	69	7.58	69	70	68	0
199/2037	40	50.76	69	7.70	70	72	68	0
199/2052	40	50.79	69	7.89	71	72	69	0
199/2107	40	50.78	69	7.70	72	76	68	0
199/2122	40	51.05	69	8.16	74	76	72	0
199/2137	40	51.38	69	8.60	74	75	72	0
199/2152	40	51.45	69	8.37	74	75	72	0
199/2207	40	51.66	69	8.07	75	77	72	0
199/2222	40	51.94	69	8.16	74	75	73	0
199/2237	40	52.39	69	8.26	74	76	71	0
199/2252	40	52.65	69	8.29	77	78	76	0
199/2307	40	52.99	69	8.19	78	81	75	0
199/2322	40	53.28	69	8.23	77	81	72	0
199/2337	40	53.72	69	8.18	71	72	69	0
199/2352	40	54.40	69	8.39	71	73	69	0
200/0007	40	54.92	69	8.30	73	76	70	0
200/0022	40	55.10	69	7.75	74	78	70	0
200/0037	40	55.59	69	7.46	72	74	70	0
200/0052	40	56.19	69	7.91	78	82	74	0
200/1339	40	52.15	69	8.88	70	75	64	0
200/1354	40	51.29	69	8.05	73	75	70	0
200/1409	40	50.44	69	7.37	70	72	68	0
200/1424	40	50.49	69	7.10	75	79	71	0
200/1439	40	50.67	69	8.46	72	75	68	0
201/0341	40	59.33	69	8.69	74	78	69	0
201/0356	40	58.03	69	8.98	69	72	66	0
201/0411	40	56.81	69	9.81	64	66	62	0
201/0526	40	52.20	69	9.82	59	64	54	1

BOX BOUNDS: 40 50.00N TO 41 0.00N; 69 10.00W TO 69 20.00W.

191/1225	40	50.88	69	19.16	37	45	22	1
191/1241	40	50.75	69	19.29	36	42	34	1
191/1257	40	50.55	69	18.67	43	50	34	1
191/1312	40	50.09	69	19.58	34	37	31	0
192/1426	40	51.62	69	19.35	31	34	28	0
192/1441	40	51.87	69	19.35	40	46	34	0
192/1558	40	51.42	69	18.37	49	53	45	1
192/1613	40	51.06	69	18.48	47	53	41	1
192/1628	40	50.77	69	18.54	46	52	41	0
192/1643	40	50.52	69	18.58	42	45	39	0
192/1658	40	50.32	69	18.63	41	44	38	0
192/1726	40	50.27	69	19.43	38	44	31	0
192/1741	40	50.09	69	19.54	32	34	29	0
192/1826	40	50.13	69	18.92	35	39	31	0
192/1841	40	50.01	69	18.92	35	38	31	0
193/0341	40	54.91	69	10.92	71	78	63	0
193/0356	40	55.00	69	13.87	69	75	62	0

BATHYMETRIC MEASUREMENTS OF PHELPS BANK
U.S.N.S. HAYES: JULY 1982

DTG.Z	LAT		LONG		DEPTH(M)			SR
	DEG	MIN	DEG	MIN	AVG	MAX	MIN	
193/0411	40	55.33	69	14.40	66	69	63	0
193/0426	40	55.34	69	13.91	68	71	64	0
193/0441	40	55.12	69	14.50	64	66	62	0
193/0456	40	54.85	69	14.79	63	65	60	0
193/0511	40	54.54	69	14.86	62	63	61	0
193/0526	40	54.21	69	15.11	62	63	59	0
193/0541	40	53.88	69	15.42	58	60	56	0
193/0556	40	53.55	69	15.66	58	60	56	0
193/0611	40	53.24	69	15.90	57	58	56	0
193/0626	40	52.92	69	16.11	57	58	56	0
193/0641	40	52.61	69	16.40	56	56	55	0
193/0656	40	52.33	69	16.90	55	56	53	0
193/0711	40	51.93	69	17.37	50	50	50	0
193/0726	40	51.37	69	17.50	50	51	50	0
193/0741	40	50.82	69	17.66	50	52	47	0
193/0756	40	50.41	69	18.14	43	48	38	1
193/1441	40	50.32	69	19.92	31	37	23	1
193/1632	40	50.35	69	19.35	34	37	31	0
193/1647	40	50.60	69	19.60	37	38	35	0
193/1747	40	50.03	69	17.90	53	54	52	0
193/1822	40	50.77	69	17.60	52	56	48	0
193/1851	40	51.53	69	17.23	50	50	50	0
193/1951	40	52.00	69	16.79	52	53	50	0
193/2041	40	50.63	69	17.25	55	58	53	0
195/0847	40	50.47	69	17.99	47	53	40	0
195/0903	40	50.58	69	18.45	43	45	40	0
195/0918	40	50.60	69	18.80	38	41	35	0
195/0933	40	50.54	69	18.63	44	48	39	0
195/0947	40	50.37	69	18.72	41	44	38	0
195/1003	40	50.18	69	19.03	35	38	30	0
195/1033	40	50.02	69	19.51	34	37	31	0
195/1048	40	50.08	69	19.53	33	36	30	0
195/1805	40	50.08	69	14.05	61	69	53	0
195/1820	40	50.19	69	10.91	63	74	52	1
199/0334	40	53.90	69	18.77	35	43	26	1
199/0349	40	53.72	69	17.15	41	53	23	0
199/0405	40	52.78	69	15.69	55	57	52	0
199/0420	40	51.82	69	14.85	59	64	54	0
199/0435	40	50.71	69	14.07	59	59	58	0
199/0735	40	50.26	69	14.11	57	59	54	0
199/0935	40	50.24	69	13.22	59	62	55	0
199/0950	40	50.50	69	13.34	60	63	55	0
199/1005	40	50.34	69	13.04	58	62	54	0
199/1035	40	50.28	69	13.12	59	63	54	1
199/1051	40	50.75	69	13.15	61	64	57	0
199/1106	40	51.26	69	13.05	62	65	58	1
199/1121	40	51.97	69	12.72	65	70	60	1

BATHYMETRIC MEASUREMENTS OF PHELPS BANK

U.S.N.S. HAYES: JULY 1982

DTG.Z	LAT		LONG		DEPTH(M)			SR
	DEG	MIN	DEG	MIN	AVG	MAX	MIN	
199/1136	40	52.05	69	12.79	63	69	57	1
199/1151	40	52.54	69	12.67	66	71	61	1
199/1206	40	53.07	69	12.32	73	78	67	0
199/1221	40	53.69	69	12.11	72	77	67	0
199/1236	40	54.44	69	12.37	71	78	64	0
199/1251	40	54.36	69	11.80	71	74	61	0
199/1306	40	54.79	69	11.05	64	67	61	0
199/1321	40	55.21	69	10.73	67	69	65	0
199/1336	40	55.40	69	10.75	68	69	67	0
199/1351	40	55.72	69	10.30	68	69	66	0
200/1239	40	51.75	69	11.51	69	72	65	0
200/1254	40	52.36	69	11.98	70	72	68	0
200/1309	40	52.53	69	11.02	68	71	65	0
200/1324	40	52.73	69	10.27	67	69	64	0
200/1454	40	50.49	69	10.76	65	71	54	1
200/1509	40	50.33	69	13.30	64	70	55	1
200/1524	40	50.19	69	15.79	59	62	55	0
200/1540	40	50.22	69	18.45	52	57	41	1
201/0026	40	55.17	69	18.46	33	44	21	1
201/0041	40	56.42	69	16.56	46	69	23	1
201/0056	40	57.64	69	15.00	66	70	61	0
201/0111	40	59.01	69	13.46	66	72	59	0
201/0426	40	55.50	69	10.51	67	70	64	0
201/0441	40	54.56	69	10.59	64	66	62	0
201/0456	40	53.93	69	10.56	63	65	61	0
201/0511	40	52.81	69	10.41	59	69	50	1
201/0542	40	52.28	69	10.43	66	69	53	1
201/0557	40	50.92	69	11.28	69	75	62	1
201/0857	40	50.03	69	16.58	56	56	56	0
201/0912	40	50.31	69	17.38	49	56	39	0
201/0927	40	50.55	69	18.32	40	47	33	0
201/0942	40	50.38	69	19.49	31	36	25	0
201/1128	40	50.22	69	19.70	33	37	28	0
201/1143	40	50.59	69	19.47	39	44	34	0
201/1158	40	50.74	69	19.40	39	40	38	0
201/1213	40	50.74	69	19.33	37	39	34	0
201/1228	40	50.72	69	19.19	36	38	34	0
201/1243	40	50.82	69	19.19	35	36	34	0
201/1258	40	51.14	69	19.36	34	37	31	0
201/1313	40	51.69	69	19.76	26	32	20	1
201/1328	40	52.75	69	19.80	36	44	27	1
201/1343	40	53.98	69	19.08	34	42	25	1
201/1358	40	54.97	69	17.84	34	42	25	1
201/1413	40	55.40	69	16.22	39	53	26	1
201/1428	40	55.40	69	14.92	58	62	53	0
201/1443	40	55.50	69	14.34	64	69	62	0
201/1458	40	55.98	69	13.88	66	67	65	0

BATHYMETRIC MEASUREMENTS OF PHELPS BANK

U.S.N.S. HAYES: JULY 1982

DTG.Z	LAT		LONG		DEPTH(M)			SR
	DEG	MIN	DEG	MIN	AVG	MAX	MIN	
201/1513	40	56.47	69	13.39	65	65	65	0
201/1528	40	56.92	69	12.96	65	66	63	0
201/1543	40	57.16	69	12.46	64	69	59	0
201/1558	40	57.42	69	12.39	64	69	59	0
201/1613	40	58.71	69	13.13	68	72	64	0
201/1628	40	59.38	69	13.63	65	67	64	0
201/1643	40	59.23	69	13.36	68	70	66	0
201/1658	40	59.06	69	13.05	69	72	66	0
201/1713	40	58.74	69	12.84	71	75	67	0
201/1728	40	57.64	69	13.28	71	75	66	0
201/1744	40	56.53	69	13.83	66	69	63	0
201/1759	40	55.38	69	14.34	64	67	61	0
201/1814	40	54.26	69	15.06	60	63	56	0
201/1829	40	53.18	69	15.81	56	59	52	0
201/1844	40	52.15	69	16.82	50	52	48	0
201/1859	40	51.18	69	17.82	44	49	39	1
201/1914	40	50.46	69	18.63	39	46	31	1
201/2029	40	50.23	69	19.98	27	28	26	0
201/2044	40	50.21	69	19.57	33	37	28	0
201/2059	40	50.19	69	19.11	33	35	31	0
201/2114	40	50.10	69	18.62	40	45	34	0
201/2349	40	52.90	69	19.92	36	44	28	1
202/0014	40	54.30	69	19.04	35	42	28	1
202/0029	40	55.78	69	17.67	31	41	21	1
202/0045	40	57.37	69	16.06	45	66	29	1
202/0100	40	58.74	69	16.23	60	69	50	0
202/0115	40	59.57	69	17.08	45	53	37	0
202/0230	40	59.75	69	15.30	64	67	62	0
202/0245	40	58.62	69	14.63	67	70	64	0
202/0300	40	57.54	69	13.82	68	72	64	0
202/0315	40	56.35	69	13.64	68	72	64	1
202/0330	40	55.07	69	13.66	68	71	65	0
202/0345	40	53.75	69	13.97	67	73	67	0
202/0400	40	52.50	69	13.25	67	72	62	1
202/0415	40	51.72	69	11.82	67	72	67	1
202/0430	40	52.01	69	11.32	66	72	63	1
202/0445	40	51.71	69	11.15	66	74	58	1
202/0500	40	51.28	69	11.42	69	75	63	1
202/0515	40	50.63	69	11.46	69	75	64	1
202/0530	40	50.37	69	11.60	67	71	62	0
202/0545	40	50.16	69	11.76	67	70	64	0
202/0600	40	50.06	69	12.17	67	69	66	0

BOX BOUNDS: 40 50.00N TO 41 0.00N; 69 20.00W TO 69 30.00W.

191/1210	40	50.65	69	20.38	30	34	25	0
191/1832	40	51.43	69	26.55	42	53	31	1
191/1847	40	50.54	69	26.99	40	50	31	1

BATHYMETRIC MEASUREMENTS OF PHELPS BANK

U.S.N.S. HAYES: JULY 1982

DTG. Z	LAT		LONG		DEPTH(M)			SR
	DEG	MIN	DEG	MIN	AUG	MAX	MIN	
191/1947	40	50.93	69	24.58	46	51	35	1
191/2002	40	51.42	69	24.89	44	51	36	1
191/2132	40	50.36	69	23.95	44	49	38	1
192/0640	40	50.13	69	27.08	43	49	35	1
192/1341	40	50.03	69	22.24	40	47	33	1
192/1356	40	50.66	69	21.08	28	40	17	0
192/1411	40	51.20	69	20.13	23	27	19	0
195/1335	40	50.01	69	20.44	25	25	24	0
198/1053	40	51.82	69	27.24	37	47	26	1
198/1108	40	54.65	69	27.18	33	44	22	0
198/1123	40	54.84	69	28.60	34	44	23	0
199/0134	40	50.99	69	29.39	39	48	29	1
199/0149	40	52.75	69	29.56	39	44	33	0
199/0204	40	53.88	69	29.44	32	37	18	0
199/0219	40	53.73	69	27.57	41	47	35	0
199/0234	40	53.42	69	25.56	44	49	39	1
199/0249	40	53.22	69	23.65	48	49	46	0
199/0304	40	53.12	69	21.86	42	49	34	1
199/0319	40	53.33	69	20.25	41	47	35	1
200/1555	40	50.42	69	21.09	32	43	22	1
200/1610	40	50.33	69	23.89	37	47	18	1
200/1625	40	50.18	69	26.74	44	50	37	1
200/2341	40	51.50	69	25.26	42	49	35	1
200/2356	40	52.87	69	21.68	43	51	35	1
201/0011	40	53.75	69	20.23	41	47	34	1
201/0957	40	50.25	69	20.33	24	27	21	1
201/1012	40	50.38	69	20.80	26	26	26	0
201/1027	40	50.33	69	20.81	24	26	22	0
201/1042	40	50.21	69	20.65	25	25	25	0
201/1057	40	50.13	69	20.41	26	27	25	0
201/1112	40	50.11	69	20.08	26	27	25	0
201/2259	40	50.07	69	20.76	25	28	22	0
201/2314	40	50.23	69	20.93	25	25	25	0
201/2329	40	50.53	69	20.96	24	26	19	0
201/2344	40	51.50	69	20.64	29	38	19	1
202/1216	40	50.23	69	26.02	44	50	38	1
202/1231	40	50.20	69	27.68	45	50	39	1

BOX BOUNDS: 40 50.00N TO 41 0.00N; 69 30.00W TO 69 40.00W.

194/1332	40	50.02	69	35.29	36	41	31	1
194/1347	40	50.09	69	35.11	36	41	31	1
194/1732	40	50.18	69	35.05	35	40	29	1
194/1747	40	50.59	69	34.77	39	44	34	1
194/1802	40	50.70	69	34.52	36	43	29	0
194/1817	40	50.14	69	34.61	32	37	27	1
194/2217	40	50.05	69	35.58	40	41	38	0
198/1138	40	54.84	69	31.74	39	47	31	1

BATHYMETRIC MEASUREMENTS OF PHELPS BANK
U.S.N.S. HAYES: JULY 1982

DTG.Z	LAT		LONG		DEPTH(M)			SR
	DEG	MIN	DEG	MIN	AUG	MAX	MIN	
198/1153	40	54.91	69	34.54	33	44	22	1
198/1208	40	55.47	69	35.71	35	41	28	1
198/1223	40	58.17	69	35.79	40	46	33	1
198/1238	40	59.96	69	35.60	37	43	31	1
198/1424	40	59.97	69	33.30	41	44	37	0
198/1439	40	59.19	69	33.12	40	44	36	0
198/1454	40	58.35	69	32.94	40	44	35	1
198/1509	40	57.44	69	32.79	37	44	30	1
198/1524	40	56.54	69	32.60	34	38	29	1
198/1539	40	56.09	69	33.12	39	44	34	0
198/1554	40	56.68	69	33.86	40	42	38	0
198/1609	40	57.33	69	34.60	40	43	35	0
198/1624	40	58.02	69	35.33	45	46	44	0
198/1639	40	58.75	69	36.01	41	45	37	0
198/1654	40	58.57	69	35.42	39	44	34	1
198/1709	40	57.19	69	33.53	37	44	30	0
198/1724	40	55.21	69	31.95	40	47	32	1
198/1739	40	53.66	69	30.83	37	44	29	1
198/1754	40	52.22	69	30.33	36	44	28	1
198/1809	40	50.06	69	30.01	42	50	34	1
200/2125	40	50.27	69	38.02	37	42	32	1
200/2140	40	50.35	69	37.46	41	44	38	0
200/2155	40	50.13	69	37.16	40	44	35	1
202/1301	40	50.12	69	30.99	38	47	33	1
202/1316	40	50.11	69	32.59	38	44	32	1
202/1346	40	50.37	69	34.66	35	42	28	1
202/1402	40	50.98	69	34.24	35	41	30	1
202/1417	40	51.49	69	33.42	37	44	30	1
202/1432	40	51.86	69	32.35	37	44	30	1
202/1447	40	51.84	69	31.14	40	44	35	1
202/1502	40	51.36	69	30.23	37	44	30	1
202/1517	40	50.82	69	30.09	40	45	35	1
202/1532	40	50.65	69	30.39	40	44	35	0
202/1547	40	50.85	69	30.62	42	44	39	0
202/1602	40	51.02	69	30.75	41	44	38	0
202/1617	40	50.85	69	30.50	42	44	41	0
202/1632	40	50.58	69	30.33	41	45	36	0
202/1647	40	50.30	69	30.25	43	45	40	0

BOX BOUNDS: 40 50.00N TO 41 0.00N; 69 40.00W TO 69 50.00W.

198/0808	40	52.27	69	43.18	32	40	24	1
198/0823	40	50.33	69	43.03	36	39	33	1

APPENDIX B

Bathymetric data from 40°45'N to 40°55'N and 69°15'W to 69°25'W tabulated for each 1 min by 1 min tessera. This area includes all of Phelps Bank and Asia Rip.

BATHYMETRIC MEASUREMENTS OF PHELPS BANK

U.S.N.S. HAYES: JULY 1982

DTG.Z	LAT		LONG		AUG	DEPTH(M)		SR
	DEG	MIN	DEG	MIN		MAX	MIN	

BOX BOUNDS:	40 45.00N	TO 40 46.00N;	69 15.00W	TO 69 16.00W.				
	193/2158	40 45.83	69 15.48		57	63	50	1
BOX BOUNDS:	40 45.00N	TO 40 46.00N;	69 18.00W	TO 69 19.00W.				
	191/1055	40 45.27	69 18.15		57	59	46	0
BOX BOUNDS:	40 45.00N	TO 40 46.00N;	69 21.00W	TO 69 22.00W.				
	191/2217	40 45.07	69 21.92		53	59	47	0
	191/2232	40 45.71	69 21.88		52	56	40	0
BOX BOUNDS:	40 45.00N	TO 40 46.00N;	69 24.00W	TO 69 25.00W.				
	191/2202	40 45.64	69 24.08		46	62	34	0
	192/0725	40 45.78	69 24.48		42	51	38	0
BOX BOUNDS:	40 46.00N	TO 40 47.00N;	69 15.00W	TO 69 16.00W.				
	195/0733	40 46.20	69 15.77		54	59	49	0
BOX BOUNDS:	40 46.00N	TO 40 47.00N;	69 18.00W	TO 69 19.00W.				
	191/1110	40 46.46	69 18.69		56	59	53	0
BOX BOUNDS:	40 46.00N	TO 40 47.00N;	69 23.00W	TO 69 24.00W.				
	191/2247	40 46.92	69 23.36		43	53	34	0
BOX BOUNDS:	40 46.00N	TO 40 47.00N;	69 24.00W	TO 69 25.00W.				
	191/2320	40 46.42	69 24.59		50	54	37	1
BOX BOUNDS:	40 47.00N	TO 40 48.00N;	69 16.00W	TO 69 17.00W.				
	192/2311	40 47.95	69 16.37		59	62	56	0
	195/0747	40 47.40	69 16.45		61	63	59	0
BOX BOUNDS:	40 47.00N	TO 40 48.00N;	69 17.00W	TO 69 18.00W.				
	193/2143	40 47.03	69 17.92		59	61	56	0
BOX BOUNDS:	40 47.00N	TO 40 48.00N;	69 19.00W	TO 69 20.00W.				
	191/1125	40 47.89	69 19.29		48	53	35	1
	193/1326	40 47.94	69 19.29		50	60	38	0
BOX BOUNDS:	40 47.00N	TO 40 48.00N;	69 20.00W	TO 69 21.00W.				
	195/1450	40 47.68	69 20.44		23	26	20	0
BOX BOUNDS:	40 47.00N	TO 40 48.00N;	69 21.00W	TO 69 22.00W.				
	195/1505	40 47.48	69 21.08		34	37	27	0
	195/1520	40 47.43	69 21.63		35	37	34	0
BOX BOUNDS:	40 47.00N	TO 40 48.00N;	69 22.00W	TO 69 23.00W.				
	191/2047	40 47.04	69 22.27		37	40	28	0

BATHYMETRIC MEASUREMENTS OF PHELPS BANK
U.S.N.S. HAYES: JULY 1982

DTG.Z	LAT		LONG		DEPTH(M)			SR
	DEG	MIN	DEG	MIN	AUG	MAX	MIN	
195/1535	40	47.42	69	22.12	38	39	36	0
195/1550	40	47.63	69	22.43	42	44	39	0
BOX BOUNDS: 40 47.00N TO 40 48.00N; 69 23.00W TO 69 24.00W.								
191/2102	40	47.84	69	23.12	47	56	28	1
195/1635	40	47.53	69	23.63	44	48	39	1
BOX BOUNDS: 40 47.00N TO 40 48.00N; 69 24.00W TO 69 25.00W.								
191/1917	40	47.73	69	24.84	41	48	32	1
191/2032	40	47.01	69	24.78	44	53	32	0
192/0710	40	47.63	69	24.67	46	49	43	0
195/1650	40	47.22	69	24.26	47	51	43	0
195/1705	40	47.94	69	24.54	47	52	41	1
BOX BOUNDS: 40 48.00N TO 40 49.00N; 69 17.00W TO 69 18.00W.								
192/2356	40	48.68	69	17.36	61	67	56	0
195/0803	40	48.39	69	17.01	58	59	56	0
BOX BOUNDS: 40 48.00N TO 40 49.00N; 69 18.00W TO 69 19.00W.								
193/0956	40	48.54	69	18.99	52	58	45	0
193/1011	40	48.40	69	18.58	57	58	56	0
193/1026	40	48.31	69	18.30	57	57	56	0
193/1041	40	48.28	69	18.21	57	58	56	0
193/1056	40	48.31	69	18.42	57	58	56	0
193/1111	40	48.32	69	18.73	55	59	51	0
193/2107	40	48.33	69	18.09	58	59	56	0
BOX BOUNDS: 40 48.00N TO 40 49.00N; 69 19.00W TO 69 20.00W.								
193/0926	40	48.75	69	19.76	28	30	25	0
193/0941	40	48.65	69	19.38	39	47	38	0
193/1126	40	48.34	69	19.16	45	52	37	0
193/1141	40	48.37	69	19.62	32	37	25	0
193/1311	40	48.25	69	19.52	47	57	35	0
193/1341	40	48.18	69	19.74	35	35	35	0
195/1420	40	48.77	69	19.29	36	40	32	0
195/1435	40	48.12	69	19.81	33	38	28	0
BOX BOUNDS: 40 48.00N TO 40 49.00N; 69 20.00W TO 69 21.00W.								
193/0856	40	48.92	69	20.22	24	26	22	0
193/0911	40	48.84	69	20.23	24	25	23	0
193/1156	40	48.46	69	20.17	23	25	22	0
193/1211	40	48.62	69	20.81	31	41	16	1
193/1241	40	48.88	69	20.68	23	24	22	0
193/1256	40	48.59	69	20.05	29	34	23	0
193/1356	40	48.61	69	20.32	22	22	22	0
BOX BOUNDS: 40 48.00N TO 40 49.00N; 69 21.00W TO 69 22.00W.								
193/1226	40	48.98	69	21.06	30	42	18	0

BATHYMETRIC MEASUREMENTS OF PHELPS BANK

U.S.N.S. HAYES: JULY 1982

DTG.Z	LAT		LONG		DEPTH (M)			SR
	DEG	MIN	DEG	MIN	AUG	MAX	MIN	
BOX BOUNDS: 40 48.00N TO 40 49.00N; 69 22.00W TO 69 23.00W.								
195/1605	40	48.23	69	22.49	44	50	37	1
195/1620	40	48.44	69	22.78	44	52	35	1
BOX BOUNDS: 40 48.00N TO 40 49.00N; 69 24.00W TO 69 25.00W.								
191/1932	40	48.94	69	24.92	51	52	41	1
191/2147	40	48.14	69	24.24	49	53	38	1
191/2305	40	48.39	69	24.41	49	53	40	1
192/1311	40	48.81	69	24.99	46	50	42	1
BOX BOUNDS: 40 49.00N TO 40 50.00N; 69 15.00W TO 69 16.00W.								
193/0011	40	49.24	69	15.37	63	71	58	1
201/0827	40	49.82	69	15.01	58	59	57	0
201/0842	40	49.88	69	15.79	56	56	56	0
BOX BOUNDS: 40 49.00N TO 40 50.00N; 69 16.00W TO 69 17.00W.								
202/0730	40	49.72	69	16.15	56	57	55	0
202/0745	40	49.85	69	16.35	55	55	55	0
202/0800	40	49.81	69	16.47	55	56	55	0
202/0815	40	49.66	69	16.66	58	60	56	0
202/0830	40	49.55	69	16.84	59	60	58	0
BOX BOUNDS: 40 49.00N TO 40 50.00N; 69 17.00W TO 69 18.00W.								
192/2326	40	49.21	69	17.82	57	59	55	0
192/2341	40	49.09	69	17.82	57	59	55	0
195/0818	40	49.18	69	17.37	57	59	55	0
195/0833	40	49.96	69	17.64	55	56	53	0
195/1750	40	49.99	69	17.05	57	59	55	0
202/0845	40	49.47	69	17.04	58	58	58	0
202/0901	40	49.48	69	17.20	58	58	58	0
202/0916	40	49.54	69	17.37	56	56	56	0
202/0931	40	49.60	69	18.00	45	56	34	1
BOX BOUNDS: 40 49.00N TO 40 50.00N; 69 18.00W TO 69 19.00W.								
191/1140	40	49.08	69	18.73	53	55	50	1
191/1155	40	49.89	69	18.76	41	50	25	1
193/0811	40	50.00	69	18.57	42	47	38	1
193/0826	40	49.50	69	18.96	40	44	34	1
193/1732	40	49.98	69	18.17	45	55	34	0
195/1149	40	49.41	69	18.84	40	44	35	0
195/1204	40	49.33	69	18.59	48	52	44	0
195/1219	40	49.20	69	18.39	54	56	52	0
201/2129	40	49.74	69	18.77	42	47	36	1
BOX BOUNDS: 40 49.00N TO 40 50.00N; 69 19.00W TO 69 20.00W.								
192/1756	40	49.97	69	19.65	31	33	29	0

BATHYMETRIC MEASUREMENTS OF PHELPS BANK
U.S.N.S. HAYES: JULY 1982

DTG.Z	LAT		LONG		DEPTH(M)			SR
	DEG	MIN	DEG	MIN	AVG	MAX	MIN	
192/1811	40	49.94	69	19.61	32	38	25	0
192/1856	40	49.96	69	19.03	35	37	32	0
192/1911	40	49.95	69	19.28	34	37	31	0
192/1926	40	49.92	69	19.85	29	33	25	0
192/1941	40	49.83	69	19.52	32	38	25	0
192/1956	40	49.87	69	19.07	37	40	35	0
193/0841	40	49.18	69	19.54	30	33	26	0
195/1018	40	49.99	69	19.38	34	37	31	0
195/1103	40	49.81	69	19.59	31	33	29	0
195/1118	40	49.48	69	19.45	32	32	31	0
195/1134	40	49.39	69	19.14	35	38	32	0
195/1305	40	49.32	69	19.65	29	31	27	0
195/1350	40	49.78	69	19.93	29	32	25	0
195/1405	40	49.36	69	19.04	38	44	32	1
195/1735	40	49.93	69	19.98	42	54	30	1
201/1929	40	49.88	69	19.26	29	33	24	0
201/1944	40	49.51	69	20.00	29	33	24	0
201/2144	40	49.68	69	19.88	28	31	25	0
201/2159	40	49.90	69	19.98	27	28	26	0
202/0946	40	49.92	69	19.46	32	35	28	0

BOX BOUNDS: 40 49.00N TO 40 50.00N; 69 20.00W TO 69 21.00W.

193/1411	40	49.18	69	20.38	23	24	21	0
193/1426	40	49.82	69	20.14	26	32	24	0
193/1456	40	49.66	69	20.47	23	25	21	0
193/1511	40	49.23	69	20.65	24	25	21	0
195/1320	40	49.85	69	20.20	25	26	24	0
201/1959	40	49.72	69	20.37	23	24	22	0
201/2014	40	49.98	69	20.20	25	26	24	0
201/2214	40	49.92	69	20.05	28	31	25	0
201/2229	40	49.95	69	20.15	24	27	21	1
201/2244	40	49.97	69	20.74	24	27	22	0
202/1001	40	49.84	69	20.14	25	27	22	0
202/1016	40	49.64	69	20.64	23	24	22	0

BOX BOUNDS: 40 49.00N TO 40 50.00N; 69 21.00W TO 69 22.00W.

191/1327	40	49.89	69	21.23	26	40	20	0
202/1031	40	49.48	69	21.05	22	25	19	1
202/1046	40	49.37	69	21.39	30	41	18	1
202/1101	40	49.31	69	21.59	41	42	40	0
202/1116	40	49.28	69	21.74	41	41	41	0
202/1131	40	49.30	69	21.83	39	40	38	0

BOX BOUNDS: 40 49.00N TO 40 50.00N; 69 22.00W TO 69 23.00W.

195/1720	40	49.55	69	22.80	34	50	19	1
202/1146	40	49.50	69	22.69	42	50	33	1

BOX BOUNDS: 40 49.00N TO 40 50.00N; 69 23.00W TO 69 24.00W.

191/2117	40	49.37	69	23.41	45	50	38	1
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BATHYMETRIC MEASUREMENTS OF PHELPS BANK

U.S.N.S. HAYES: JULY 1982

DTG.Z	LAT		LONG		DEPTH(M)			SR
	DEG MIN		DEG MTN		AVG	MAX	MIN	
192/1326	40	49.41	69	23.62	44	49	39	1
BOX BOUNDS: 40 49.00N TO 40 50.00N; 69 24.00W TO 69 25.00W.								
191/1342	40	49.77	69	24.48	44	50	35	1
202/1201	40	49.94	69	24.37	45	49	41	1
BOX BOUNDS: 40 50.00N TO 40 51.00N; 69 15.00W TO 69 16.00W.								
200/1524	40	50.19	69	15.79	59	62	55	0
BOX BOUNDS: 40 50.00N TO 40 51.00N; 69 16.00W TO 69 17.00W.								
201/0857	40	50.03	69	16.58	56	56	56	0
BOX BOUNDS: 40 50.00N TO 40 51.00N; 69 17.00W TO 69 18.00W.								
193/0741	40	50.82	69	17.66	50	52	47	0
193/1747	40	50.03	69	17.90	53	54	52	0
193/1822	40	50.77	69	17.60	52	56	48	0
193/2041	40	50.63	69	17.25	55	58	53	0
195/0847	40	50.47	69	17.99	47	53	40	0
201/0912	40	50.31	69	17.38	49	56	39	0
BOX BOUNDS: 40 50.00N TO 40 51.00N; 69 18.00W TO 69 19.00W.								
191/1257	40	50.55	69	18.67	43	50	34	1
192/1628	40	50.77	69	18.54	46	52	41	0
192/1643	40	50.52	69	18.58	42	45	39	0
192/1658	40	50.32	69	18.63	41	44	38	0
192/1826	40	50.13	69	18.92	35	39	31	0
192/1841	40	50.01	69	18.92	35	38	31	0
193/0756	40	50.41	69	18.14	43	48	38	1
195/0903	40	50.58	69	18.45	43	45	40	0
195/0918	40	50.60	69	18.80	38	41	35	0
195/0933	40	50.54	69	18.63	44	48	39	0
195/0947	40	50.37	69	18.72	41	44	38	0
200/1540	40	50.22	69	18.45	52	57	41	1
201/0927	40	50.55	69	18.32	40	47	33	0
201/1914	40	50.46	69	18.63	39	46	31	1
201/2114	40	50.10	69	18.62	40	45	34	0
BOX BOUNDS: 40 50.00N TO 40 51.00N; 69 19.00W TO 69 20.00W.								
191/1225	40	50.88	69	19.16	37	45	22	1
191/1241	40	50.75	69	19.29	36	42	34	1
191/1312	40	50.09	69	19.58	34	37	31	0
192/1726	40	50.27	69	19.43	38	44	31	0
192/1741	40	50.09	69	19.54	32	34	29	0
193/1441	40	50.32	69	19.92	31	37	23	1
193/1632	40	50.35	69	19.35	34	37	31	0
193/1647	40	50.60	69	19.60	37	38	35	0
195/1003	40	50.18	69	19.03	35	38	30	0

BATHYMETRIC MEASUREMENTS OF PHELPS BANK
U.S.N.S. HAYES: JULY 1982

DTG.Z	LAT		LONG		DEPTH(M)			SR
	DEG	MIN	DEG	MIN	AVG	MAX	MIN	
195/1033	40	50.02	69	19.51	34	37	31	0
195/1048	40	50.08	69	19.53	33	36	30	0
201/0942	40	50.38	69	19.49	31	36	25	0
201/1128	40	50.22	69	19.70	33	37	28	0
201/1143	40	50.59	69	19.47	39	44	34	0
201/1158	40	50.74	69	19.40	39	40	38	0
201/1213	40	50.74	69	19.33	37	39	34	0
201/1228	40	50.72	69	19.19	36	38	34	0
201/1243	40	50.82	69	19.19	35	36	34	0
201/2029	40	50.23	69	19.98	27	28	26	0
201/2044	40	50.21	69	19.57	33	37	28	0
201/2059	40	50.19	69	19.11	33	35	31	0
BOX BOUNDS: 40 50.00N TO 40 51.00N; 69 20.00W TO 69 21.00W.								
191/1210	40	50.65	69	20.38	30	34	25	0
195/1335	40	50.01	69	20.44	25	25	24	0
201/0957	40	50.25	69	20.33	24	27	21	1
201/1012	40	50.38	69	20.80	26	26	26	0
201/1027	40	50.33	69	20.81	24	26	22	0
201/1042	40	50.21	69	20.65	25	25	25	0
201/1057	40	50.13	69	20.41	26	27	25	0
201/1112	40	50.11	69	20.08	26	27	25	0
201/2259	40	50.07	69	20.76	25	28	22	0
201/2314	40	50.23	69	20.93	25	25	25	0
201/2329	40	50.53	69	20.96	24	26	19	0
BOX BOUNDS: 40 50.00N TO 40 51.00N; 69 21.00W TO 69 22.00W.								
192/1356	40	50.66	69	21.08	28	40	17	0
200/1555	40	50.42	69	21.09	32	43	22	1
BOX BOUNDS: 40 50.00N TO 40 51.00N; 69 22.00W TO 69 23.00W.								
192/1341	40	50.03	69	22.24	40	47	33	1
BOX BOUNDS: 40 50.00N TO 40 51.00N; 69 23.00W TO 69 24.00W.								
191/2132	40	50.36	69	23.95	44	49	38	1
200/1610	40	50.33	69	23.89	37	47	18	1
BOX BOUNDS: 40 50.00N TO 40 51.00N; 69 24.00W TO 69 25.00W.								
191/1947	40	50.93	69	24.58	46	51	35	1
BOX BOUNDS: 40 51.00N TO 40 52.00N; 69 16.00W TO 69 17.00W.								
193/1951	40	52.00	69	16.79	52	53	50	0
BOX BOUNDS: 40 51.00N TO 40 52.00N; 69 17.00W TO 69 18.00W.								
193/0711	40	51.93	69	17.37	50	50	50	0
193/0726	40	51.37	69	17.50	50	51	50	0
193/1851	40	51.53	69	17.23	50	50	50	0

BATHYMETRIC MEASUREMENTS OF PHELPS BANK
U.S.N.S. HAYES: JULY 1982

DTG.Z	LAT		LONG		DEPTH(M)			SR
	DEG	MIN	DEG	MIN	AVG	MAX	MIN	
201/1859	40	51.18	69	17.82	44	49	39	1
BOX BOUNDS: 40 51.00N TO 40 52.00N; 69 18.00W TO 69 19.00W								
192/1558	40	51.42	69	18.37	49	53	45	1
192/1613	40	51.06	69	18.48	47	53	41	1
BOX BOUNDS: 40 51.00N TO 40 52.00N; 69 19.00W TO 69 20.00W								
192/1426	40	51.62	69	17.35	31	34	28	0
192/1441	40	51.87	69	19.35	40	46	34	0
201/1258	40	51.14	69	19.36	34	37	31	0
201/1313	40	51.69	69	19.76	26	32	20	1
BOX BOUNDS: 40 51.00N TO 40 52.00N; 69 20.00W TO 69 21.00W								
192/1411	40	51.20	69	20.13	23	27	19	0
201/2344	40	51.50	69	20.64	29	38	19	1
BOX BOUNDS: 40 51.00N TO 40 52.00N; 69 24.00W TO 69 25.00W								
191/2002	40	51.42	69	24.89	44	51	36	1
BOX BOUNDS: 40 52.00N TO 40 53.00N; 69 15.00W TO 69 16.00W								
199/0405	40	52.78	69	15.69	55	57	52	0
BOX BOUNDS: 40 52.00N TO 40 53.00N; 69 16.00W TO 69 17.00W								
193/0626	40	52.92	69	16.11	57	58	56	0
193/0641	40	52.61	69	16.40	56	56	55	0
193/0656	40	52.33	69	16.90	55	56	53	0
201/1844	40	52.15	69	16.82	50	52	48	0
BOX BOUNDS: 40 52.00N TO 40 53.00N; 69 19.00W TO 69 20.00W								
201/1328	40	52.75	69	19.80	36	44	27	1
201/2349	40	52.90	69	19.92	36	44	28	1
BOX BOUNDS: 40 52.00N TO 40 53.00N; 69 21.00W TO 69 22.00W								
200/2356	40	52.87	69	21.68	43	51	35	1
BOX BOUNDS: 40 53.00N TO 40 54.00N; 69 15.00W TO 69 16.00W								
193/0541	40	53.88	69	15.42	58	60	56	0
193/0556	40	53.55	69	15.66	58	60	56	0
193/0611	40	53.24	69	15.90	57	58	56	0
201/1829	40	53.18	69	15.81	56	59	52	0
BOX BOUNDS: 40 53.00N TO 40 54.00N; 69 17.00W TO 69 18.00W								
199/0349	40	53.72	69	17.15	41	53	23	0
BOX BOUNDS: 40 53.00N TO 40 54.00N; 69 18.00W TO 69 19.00W								
199/0334	40	53.90	69	18.77	35	43	26	1
BOX BOUNDS: 40 53.00N TO 40 54.00N; 69 19.00W TO 69 20.00W								
201/1343	40	53.98	69	19.08	34	42	25	1

BATHYMETRIC MEASUREMENTS OF PHELPS BANK

U.S.N.S. HAYES: JULY 1982

DTG.Z	LAT DEG MIN	LONG DEG MIN	DEPTH(M) AVG MAX MIN	SR
BOX BOUNDS: 40 53.00N TO 40 54.00N; 69 20.00W TO 69 21.00W.				
199/0319	40 53.33	69 20.25	41 47 35	1
201/0011	40 53.75	69 20.23	41 47 34	1
BOX BOUNDS: 40 53.00N TO 40 54.00N; 69 21.00W TO 69 22.00W.				
199/0304	40 53.12	69 21.86	42 49 34	1
BOX BOUNDS: 40 53.00N TO 40 54.00N; 69 23.00W TO 69 24.00W.				
199/0249	40 53.22	69 23.65	48 49 46	0
BOX BOUNDS: 40 54.00N TO 40 55.00N; 69 15.00W TO 69 16.00W.				
193/0526	40 54.21	69 15.11	62 63 59	0
201/1814	40 54.26	69 15.06	60 63 56	0
BOX BOUNDS: 40 54.00N TO 40 55.00N; 69 17.00W TO 69 18.00W.				
201/1358	40 54.97	69 17.84	34 42 25	1
BOX BOUNDS: 40 54.00N TO 40 55.00N; 69 19.00W TO 69 20.00W.				
202/0014	40 54.30	69 19.04	35 42 28	1